

What is This Thing Called ‘Agile’?

John C Goodpasture

There are new and challenging ideas in project management, ideas especially suited for managing dynamically complex software projects — projects that put ever increasing complexity in the hands of users and consumers. ‘Agile’ is the umbrella term for what we are talking about. In this article, the author explores the motivations for the Agile Movement and the advantages, agile methods have for small software projects. Agile is not a silver bullet, but it has the potential to be very effective, when requirements are dynamic, the customer has an urgent need, and the deadlines for value delivery are short.

Dilbert: We need 3 more programmers.

Boss: Use agile programming methods.

Dilbert: Agile programming does not mean doing more work with less people.

Boss: Find me some words that do mean that and ask again.

– Dilbert™ is a creation of Scott Adams

Agile means small teams, working collectively and collaboratively, to deliver “frequent, incremental releases of innovative functions and features, developed iteratively and by evolutionary builds, prioritized just-in-time for need and affordability, and produced at the best possible value”.

Frequent, incremental releases mean that several times a year, as often as the enterprise can absorb change, even every few weeks, an update to the product base is put into production.

‘Developed iteratively’, means that each build is the product of revisiting the development cycle repetitively, each cycle addressing some subset of the requirements, and several such cycles making up the release. ‘Evolutionary’ means that the product is not fully planned in advance; the design features and functions emerge and become defined during development cycles; and releases as users have a chance to evaluate and critique the solution.

‘Prioritized just-in-time for need and affordability’ means that the customer has a seat at the table, so as to speak. The customer is allowed to change requirements and set priorities at every release, although constrained within a limit of affordability, specified in the business plan.

And ‘produced at the best possible value’ means that the customer will get a lot for the budget, but the scope may vary a bit from the vision described in the business plan. Requirements are never really frozen or baselined, so the final product may have features and functions, not originally envisioned.

About the Author

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Many Methodologies Called Agile

The methodologies included under the agile umbrella go by many names: SCRUM, XP, CRYSTAL Family, EVO, and DSDM.¹ And, the others are: Feature-driven Design, Adaptive Software Development, Lean Development, Team Software Process (TSP) and Personal Software Process (PSP).² All embrace the Agile Manifesto and the Agile Principles supported by the Agile Alliance.³

Before these, there were others that had a longer legacy and had set the stage: Spiral, RUP, JAD, and RAD, to name a few.⁴ Each in its own way, address the ever-present dilemma in user-dominated software, to wit: what the customer says they need and want, is constantly uncertain and often unaffordable, sometimes not even feasible. Indeed, like the classic case of the 'wicked problem', the 'solution often defines the requirements' – "I'll know it when I see it!"⁵

What agile methods do is, empower small teams to rapidly respond to a changing landscape and deliver customer value quickly, well within the longer cycles of business and markets. Agile teams work in small chunks of scope that can be stabilized over relatively short periods, consulting customers and users as the solution emerges, releasing product increments frequently, and then inviting serious critique after every release.

Not Plan-Driven

Agile is the antithesis of the plan-driven methods, the main example of many years being the waterfall method, but more recently ISO 12207, CMM (I),⁶ Prince 2, and high reliability methods like Clean Room.⁷ Unquestionably, plan-driven methodologies have their place. When the requirements are safety-critical, mission-critical, high reliability, or security critical, the careful structured analysis of requirements accompanied by strict governance is mandated.

To say agile methods are not plan-driven does not mean that agile projects are not planned – they are, but more just-in-time, than the plan-driven sequential methodologies. The top-level agile plan is in the business case. Detail plans are made by teams as work begins.

¹ XP is the acronym for 'extreme programming'. EVO stands for the Evolutionary methodology. DSDM is Dynamic Systems Development Method.

² PSP and TSP are service marks of Carnegie Mellon University.

³ See <http://www.agilealliance.com> and <http://www.agilemanifesto.org/>

⁴ Acronyms in this list are RUP for Rational Unified Process, a product of IBM/Rational, RAD for rapid application development, JAD for joint application development.

⁵ The so-called 'wicked problem' is a class of problems that are somewhat circular and for which, the requirements cannot be stated, until the solution is in place. These problems are often political, sometimes subjectively social, and other times technical. There is a body of knowledge around solving wicked problems. See my blog at johngoodpasture.blogspot.com for more information.

⁶ CMM (I) is Capability Maturity Model – Integration that puts together software engineering, system engineering, and product integration in a coordinated set of practices. CMM (I) is a service mark of Carnegie Mellon University.

⁷ TSP, Team Software Process, PSP, Personal Software Process are service marks of Carnegie Mellon University.

Do These Methods Work?

The quick-read bottom line on agile methods is that they do work, they do shorten the schedule, and they do provide a very high quality product (Table 1).⁸ However, agile is not a silver bullet; it is not appropriate in all situations, and only works, if the proper environment and management mind-set are provided to the project.

Table 1: Agile Methodologies

- Agile methodologies depart in significant ways from traditional project protocols.
- They are most applicable, when requirements are changing, unknown, or unknowable.
- They work best in project situations of less than a handful of small teams, typically fewer than 50 developers.
- They work better in-house than through the constraint of a contract; they work better co-located than though the cultural translation of a virtual team.
- Process-centric methods are better for safety-critical and high-reliability programs.

Project managers should look seriously at what is happening here. The troublesome shortfalls in performance and customer value, made all the more acute by the rapid business cycles in the web era, caused some industry innovators to look at the whole thing in an entirely different way. From the product development community, the software engineering community, and the system engineering community, truly innovative protocols have been devised and put into practice. These procedures, not only apply project talent differently, but also reorder the intuitive sequence of project events that has been the mainstay for generations.

The Agile Project Life Cycle

Agile methods are the antithesis of what program and project managers know as the Plan-Driven Project Development Life Cycle (PD-PDLC) (Table 2). The PD-PDLC is sequential, beginning with gathering requirements and ending with delivering products. Plan-driven methods are characterized by the Big Design Up Front (BDUF). The Agile PDLC, Ag-PDLC, is entirely different, as shown in Table 2.

Table 2: The Agile PDLC, Ag-PDLC

- Outcomes are incrementally planned and specified, built iteratively, and delivered in frequent releases of limited but valuable capabilities.
- Agile projects are governed by a top level business plan that envisions a product goal, business milestones, and a level of affordability.
- Scope and quality, the budget, and the schedule are framed in the business plan but the details emerge as the project progresses.
- Value is earned incrementally as outcomes are committed to production.
- Customers are allowed to change their mind from one release to the next in order to keep the value proposition ever in alignment with business and market realities.

⁸ For some metric information on the track record of agile projects, see Appendix E, Empirical Information in: Boehm B and Turner R (2004), *Balancing Agility and Discipline*, Appendix E, Addison-Wesley, New York.

The Ag-PDLC has four distinguishing characteristics that set it apart from the PD-PDLC:

1. Emergent

The processes and procedures used by the implementation teams emerge from the team's analysis of the requirements and tasks. In effect, teams adapt; process control is achieved empirically by observation and reaction, not by defined capabilities with error bounds, as in Six Sigma.⁹

2. Iterative

The PDLC is a string of iterations in which, a backlog of requirements is burned-down one iteration at a time, until exhausted.

3. Evolutionary

The product details adapt to the customer needs and wants. The customer is allowed to reset priorities, add, delete, and change the backlog, according to market and business need.

4. Incremental

The outcomes of iterations are packaged for release to production as an increment to the product base.

Note: It takes a combination of the incremental and the evolutionary to really be agile. Some PD-PDLCs are incremental, but not evolutionary.

To maintain alignment of deliveries with the value proposition in the business case, iterations are relatively short, from about 2-3 weeks in the XP methodology, 30 days in SCRUM, to something longer, according to circumstances in Crystal and EVO. Releases are made as frequently as the business can absorb change, but typically, no less frequently than a calendar quarter. There are no hard and fast rules; each project sets the agenda with the customer.

A Process of Cycles

All agile methodologies are about responsiveness, exercised iteratively. All methods embrace the concept of repeating nested cycles, although the terminology varies from one method to the next.

The building block is the standard day, ideally an eight hour stint of value-added activity. Each day begins with a team review that is time-boxed – that is, limited to a fixed time duration – followed by development activity, inspection, and ideally ending with the day's outcome integrated into the product base.

Iterations are built up of days. In SCRUM, the iteration is called a sprint; in EVO it is a delivery cycle. An iteration is a time-boxed duration of a few weeks at most, during which, a selected backlog of requirements is developed. The requirements are made stable during the iteration. The change to the product base at the end of the iteration is a product increment.

Iterations, one or more, build up a release event. A release is a product increment going into production operations for internal or external use.

⁹ Six Sigma is a quality management process in which, a problem analysis protocol is followed by solutions that implement error control within approximately three parts in a million. Errors are sensed and corrective information is fed back to bring the process within the Six Sigma boundaries. Defined process control is a concept of manufacturing, promoted strongly by the work of W. Edwards Deming and others in the post World War II era. It presumes definable error limits that are acceptable in the finished product, means to measure, and means to correct. See Schawber K (2004), *Agile Project Management with SCRUM*, pp. 2-4, Microsoft Press, Redmond, WA.

Plans are made around rolling waves.¹⁰ A wave is a planning horizon, consisting of one or more releases. The planning horizon, typically not more than a few months, is the distance we can see ahead with reasonable project level vision.

Waves are synchronized with business cycles. The normal business cycles are quarterly, annual, and multi-year, to correspond to tactical results, annual results, and strategic planning, respectively.

Agile Teams

Agile teams are small, self-organized units that are multifunctional and internally redundant. Teams stay together for the life of the project. In general, teams do not handover their outcomes to other teams. The outcomes of each team are integrated into production at each release. Teams are coached by the project manager but otherwise organize themselves for the daily work cycle.

The work ethic of teams is collaborative in a manner that each member is assisted by others. In the XP methodology, members program in pairs. Each member is committed and accountable for his own work and the success of the team. Projects scale up by adding teams. A coordinating body of team leaders meets daily to coordinate team work.

The value of agile methods is the success that meets frequent, incrementally delivered features and functions, even in the swirl of complex and uncertain requirements

Communications within teams is by face-to-face discussions and documentation outside of coding comments is minimized. In a practice called Test-Driven-Design, XP methodologists document requirements by using test scripts. If virtual teams are employed, a special effort is made to reduce communications friction, so that an efficient daily cycle is maintained.

Conclusion

The value of agile methods is the success that meets frequent, incrementally delivered features and functions, even in the swirl of complex and uncertain requirements.

Plan-driven methods have their place, particularly on projects of high scale, safety-critical requirements, mission-critical objectives, and many contract situations. However, they are decidedly not appropriate in a dynamic requirement environment, not appropriate to fast and incremental delivery, and are very cost inefficient on smaller projects.

The sweet spot for agile projects is teams of less than 50 developers, where there is high value placed collaborative work ethics and personal commitment and accountability for success.

At the end of the day, we say that agile is: Small teams, working collectively and collaboratively, with this mission:

To deliver “frequent, incremental releases of innovative functions and features, developed iteratively and by evolutionary builds, prioritized just-in-time for need and affordability, and produced at the best possible value”. ❖

Reference # 17M-2009-08-06-01

¹⁰ Goodpasture J (2007), “A Risk Perspective: Rolling Wave Planning is a Bet”, *Projects and Profits*, December, pp. 48-53.